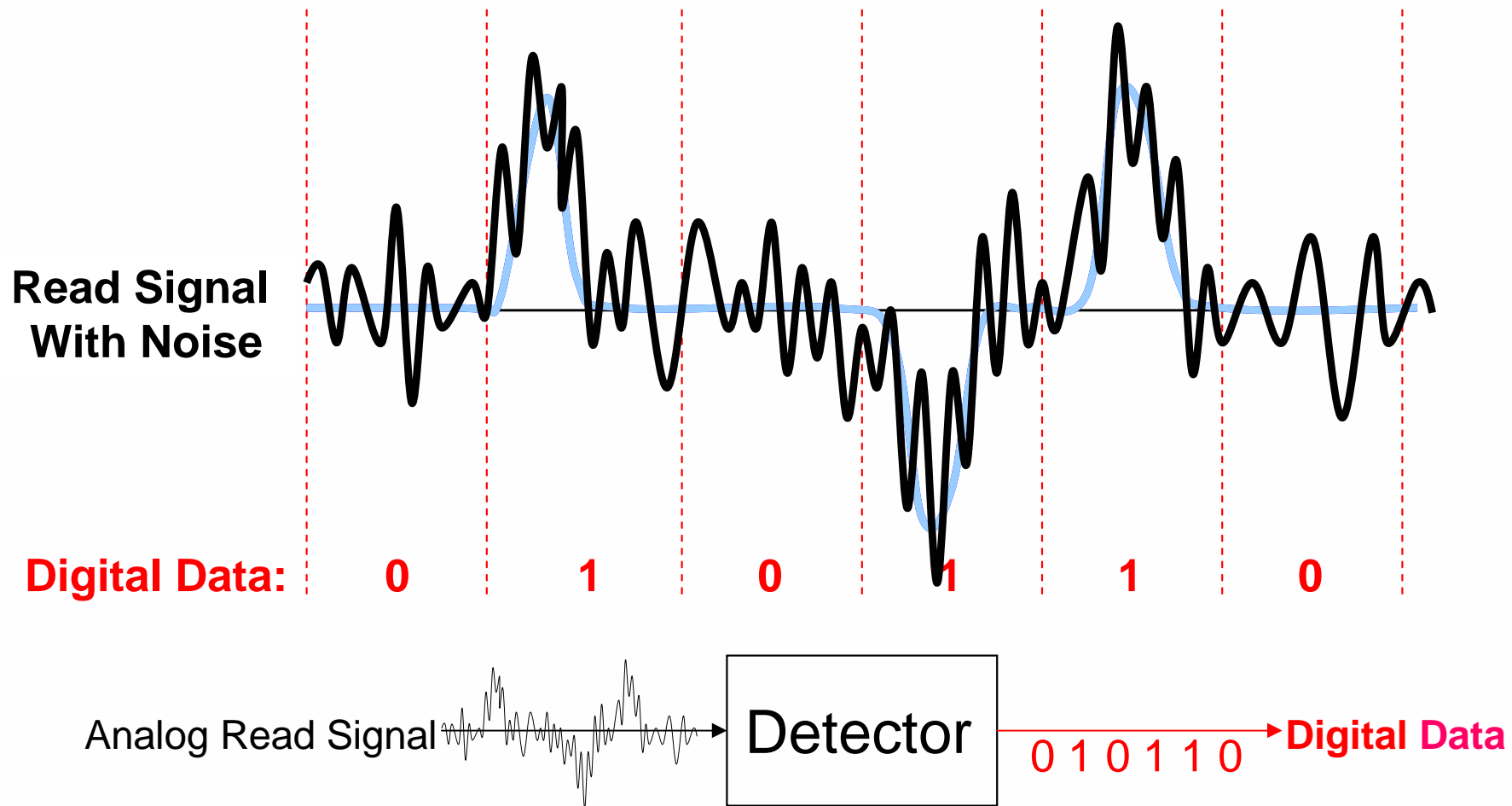


# Detectors

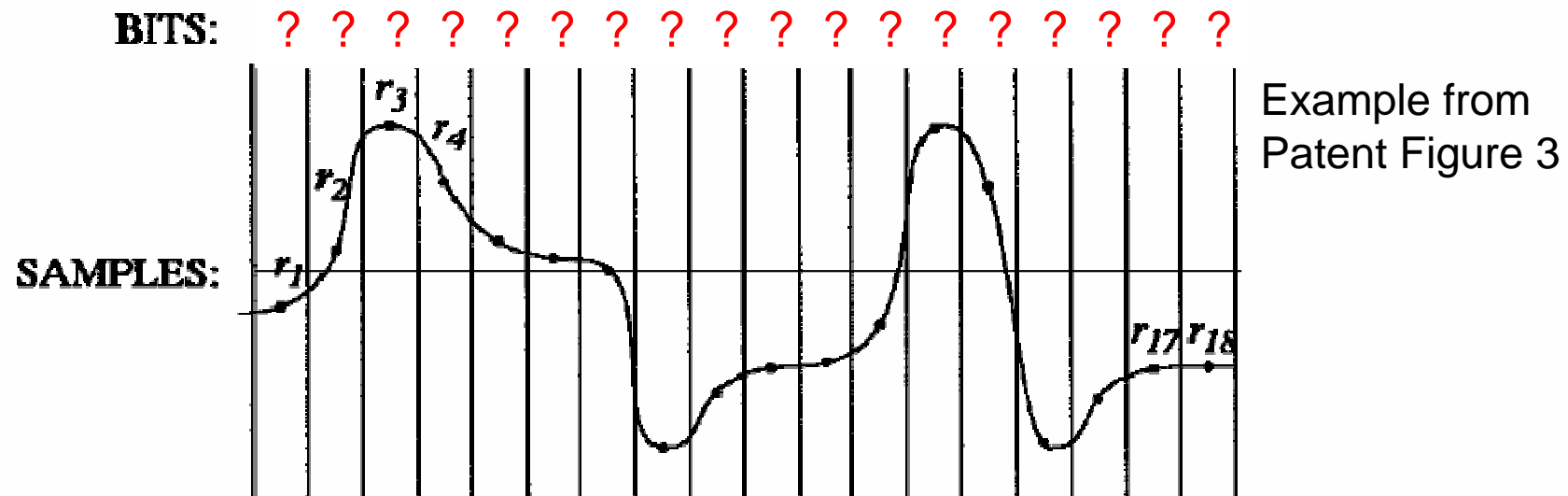


- Input: Receives Signal with Noise
- Output: Digital Data

# Two Types of Detectors

- Peak Detectors
  - Identifies peaks in signal
  - Simple and fast detector
- Sequence Detectors
  - Analyzes a sequence of consecutive data
  - Flexibility for addressing noise
  - Can require complex math & statistics

# Signal Samples



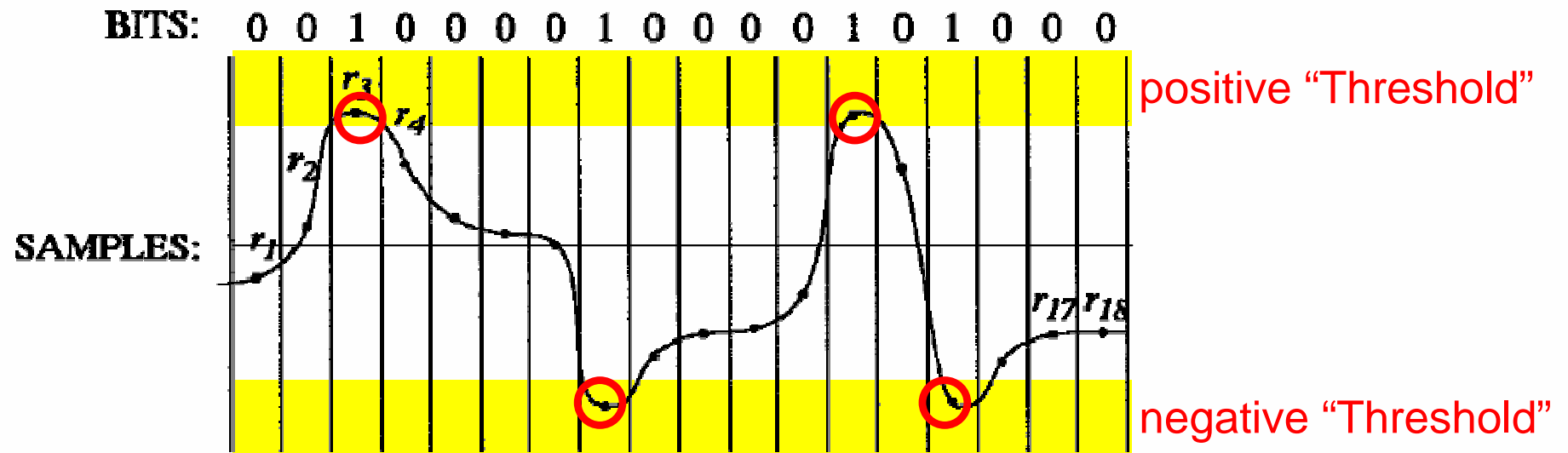
Kavcic and Moura, *Correlation-Sensitive Adaptive Sequence Detection*, IEEE Transactions on Magnetics, Vol. 34, No. 3 (May 1998).

- Detectors find data bits from signal samples

“Signal sample” means “a value of a signal at a certain point in time.”

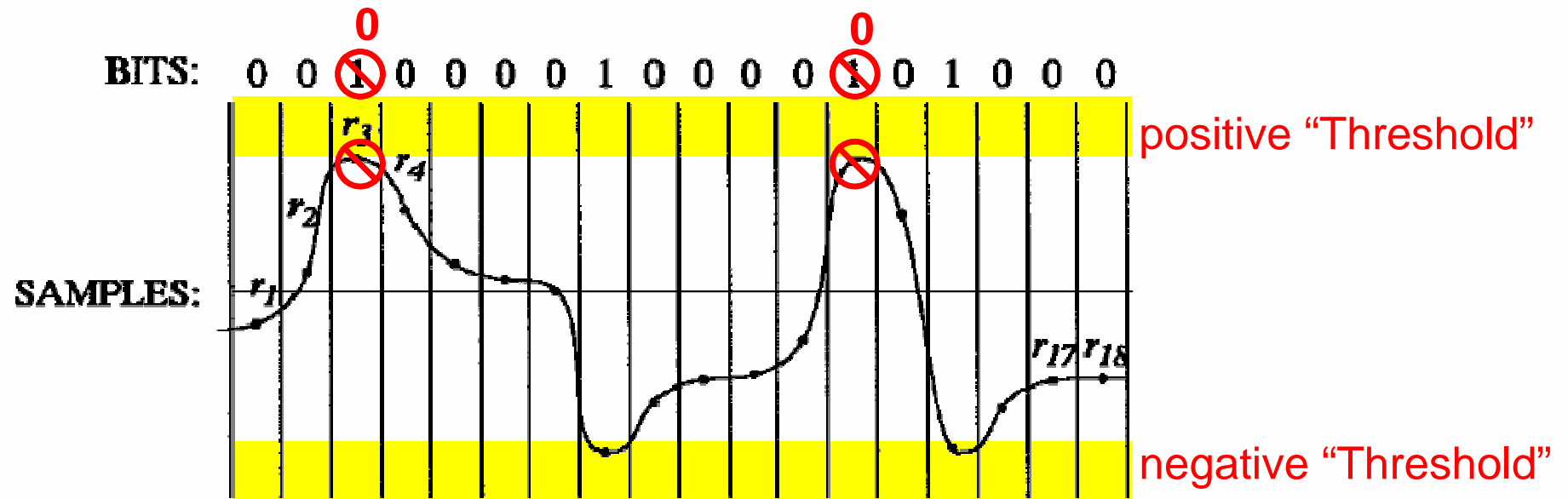
Joint Agreed Claim Terms (Dkt. 74)

# Peak Detector



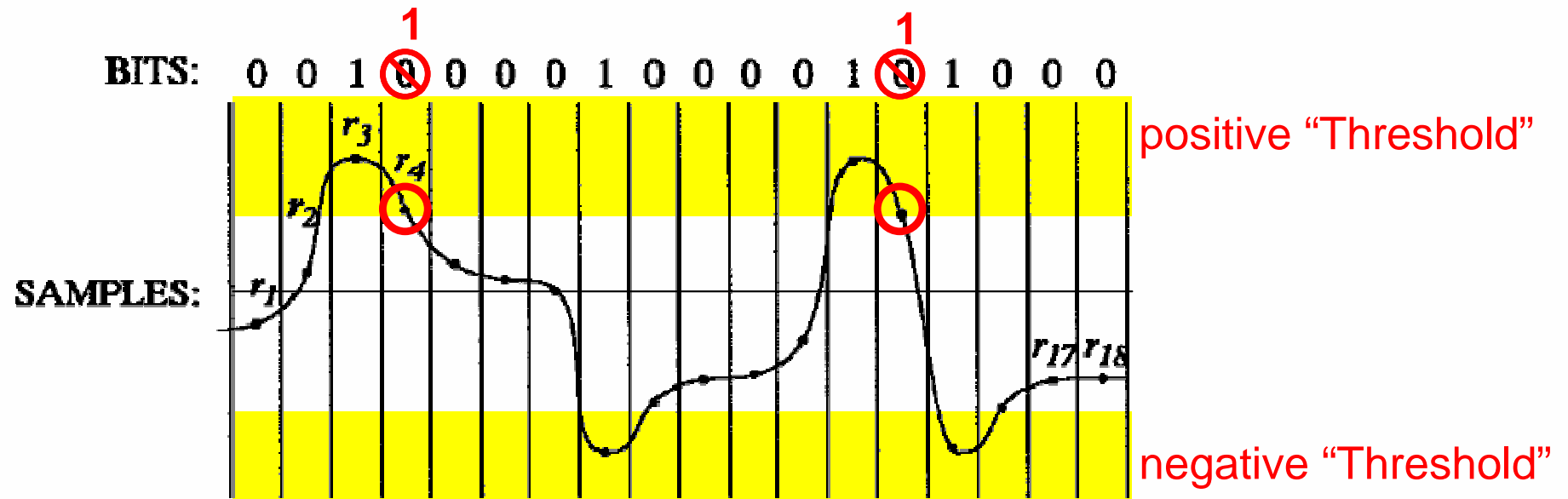
- Samples past "Threshold" are 1's
- Samples under "Threshold" are 0's

# Peak Detector: Problems



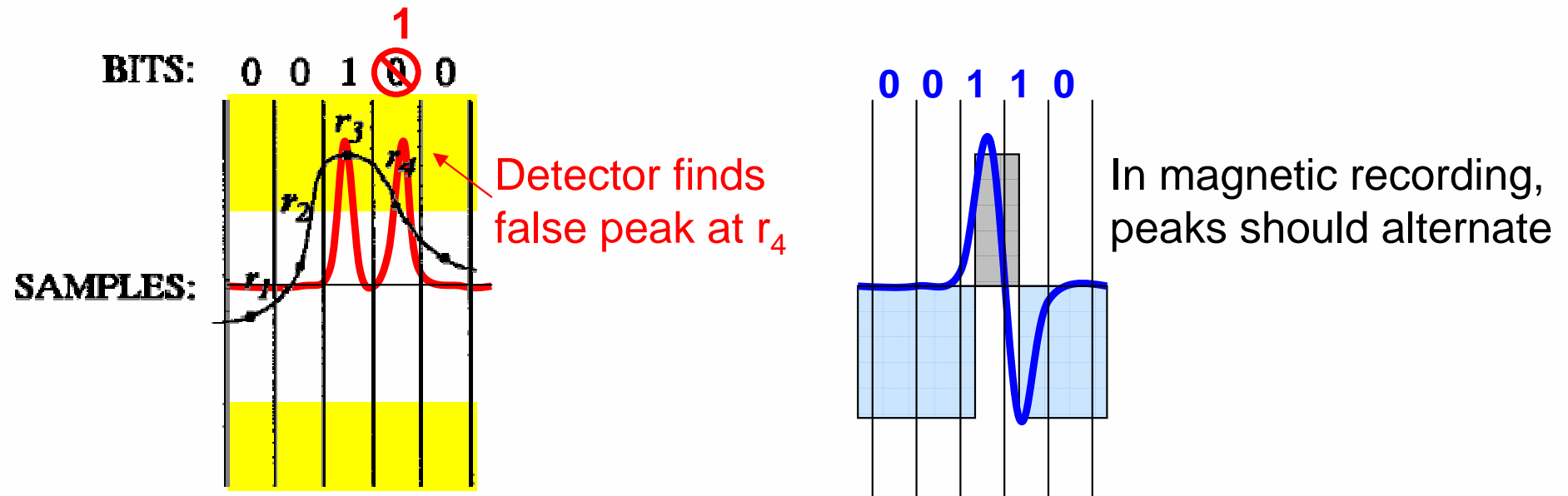
- Peaks may be missed
- Occurs if peak does not reach "Threshold"

# Peak Detector: Problems



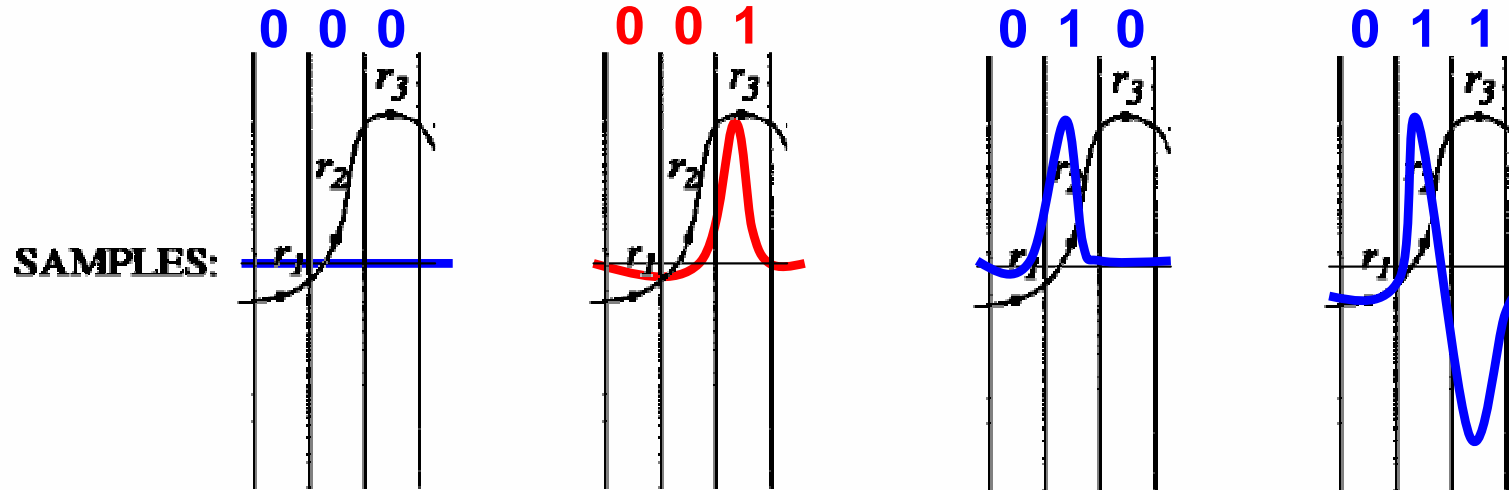
- False peaks may be detected
- Occurs if peaks are too wide

# Peak Detector: Problems



- False peak inconsistent with magnetic recording
  - Magnetic transitions reverse direction
  - Peaks should alternate from positive to negative
- A sequence detector can address these problems

# What is Sequence Detection?



- Finds the best sequence to match the samples
  - Only considers possible sequences
  - Uses rules based on magnetic recording

“Sequence detection” means “detection of a sequence of symbols.”

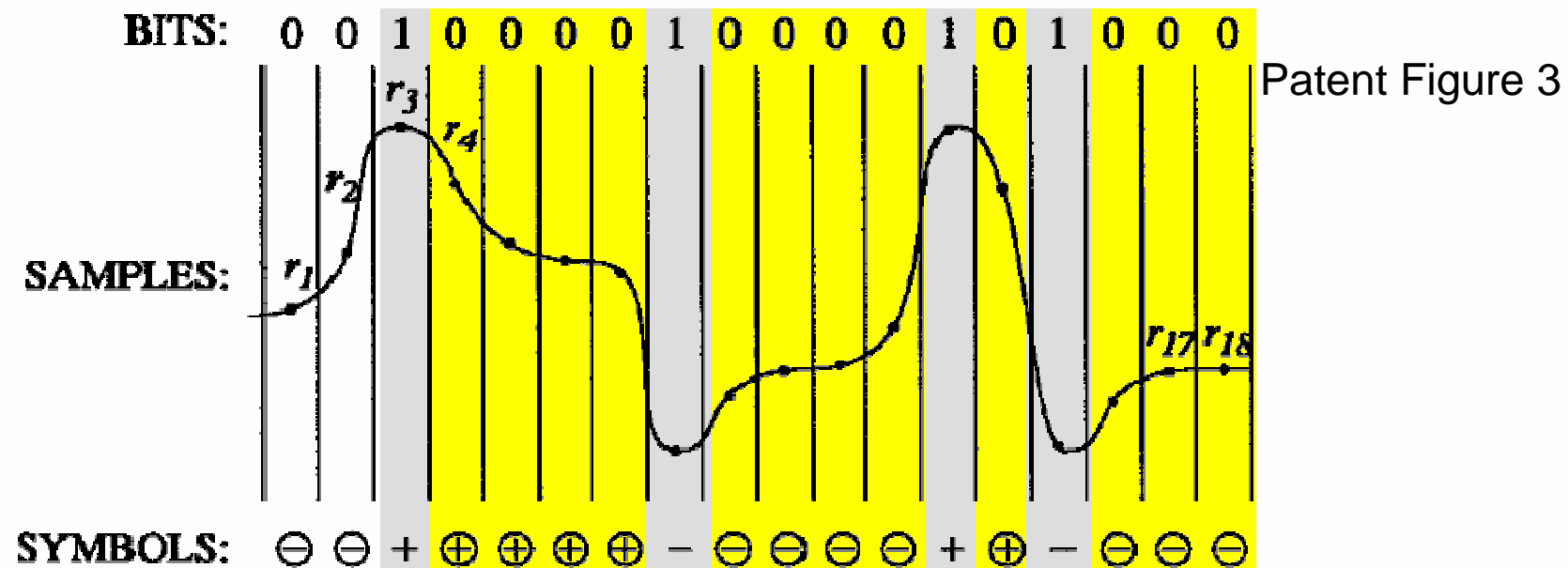
Joint Agreed Claim Terms (Dkt. 74)

- 
- Patent Figure 3

# Key

- 27

# Rules Govern the Sequence of Symbols



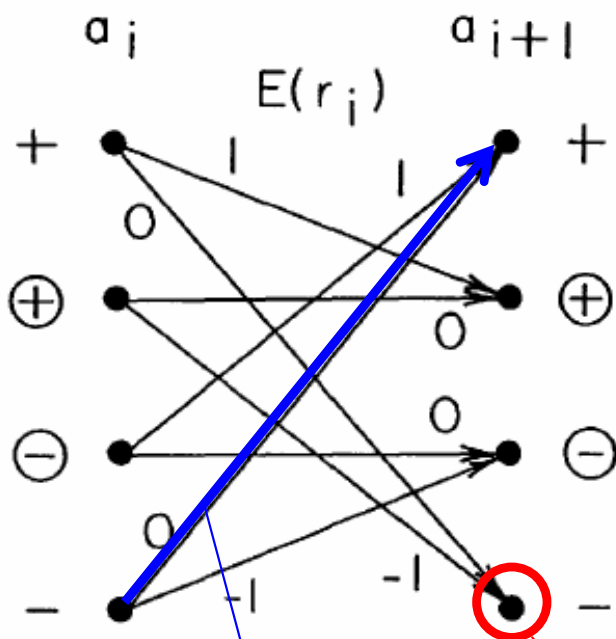
## Rules

- + and – must alternate
  - – follows + or  $\oplus$
  - + follows – or  $\ominus$
- $\oplus$ 's follow a +
- $\ominus$ 's follow a –

# Trellis Diagram (Patent Figure 4)

- Rules can be shown in a Trellis

*FIG. 4*



“Trellis” means “a graphical representation of the progression of states of a communications channel in time, wherein **states** are depicted as nodes and potential **transitions** between states are depicted as lines or arrows.”

“**Branch**” means “a potential transition between two **states (nodes)** immediately adjacent in time in a ‘trellis.’”

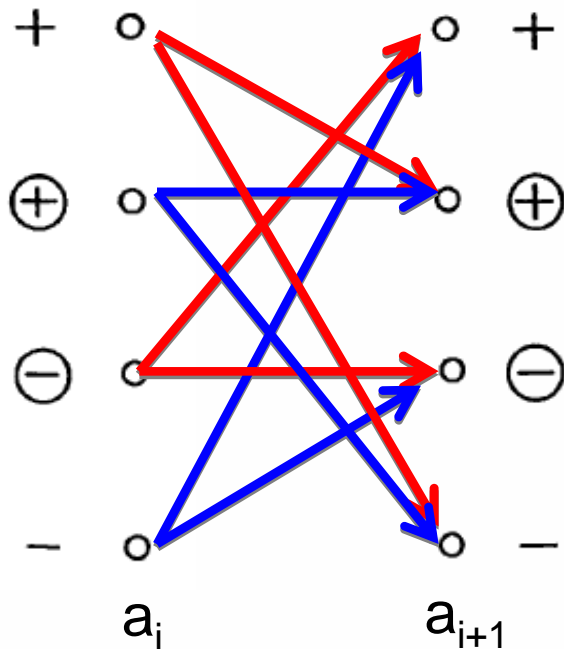
Joint Agreed Claim Terms (Dkt. 74)

State (node)

Transition (“Branch”)

# Trellis Diagram Rules

- Branches:



- $+$  must follow  $\ominus$  or  $-$
- $\oplus$  must follow  $\oplus$  or  $+$
- $\ominus$  must follow  $\ominus$  or  $-$
- $-$  must follow  $\oplus$  or  $+$